FEATURE

NASA to Monitor Coral Reef Health with Airplane Sensors **12**

Scientists will soon be able to learn more about the health of coral reefs thanks to instruments s thousands of feet and miles above them. A NASA researcher has found these so-called "canar oceans" can be monitored by sensors on airplanes and satellites.

Coral reefs are essential in ocean productivity and coastline protection, often providing the first about marine ecosystem health. The world's reefs have shrunk to one-half to one-tenth of their size due to climate and human impacts and respond immediately to environmental changes.

Getting a Closer Look

Liane Guild, a scientist at NASA Ames Research Center, and a group of researchers first use a "spectroradiometer," a device that measures the amount of ultraviolet, visible and infrared light from an object, similar to those aboard remote-sensing airplanes and satellites. By using the in at varying ocean depths, they are able to learn how light intensity decreases in columns of wat throughout a coral reef.

Since water filters out infrared light, coral reef health can only be detected by using aircraft with visible light sensors. But first, they "must look at coral close up, underwater, to see what spectr reflectance in the visible light range the sensor picks up from diseased, stressed, and healthy c Guild.

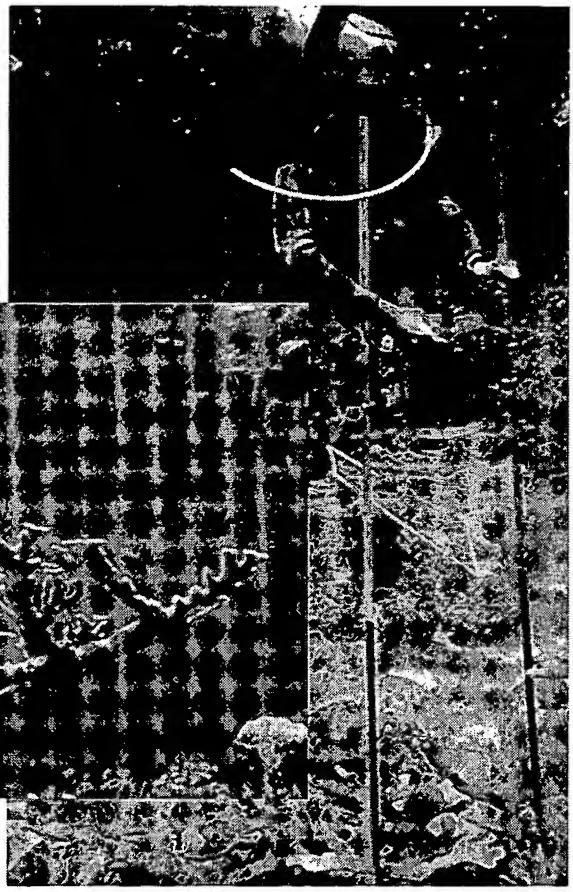
In July and August 2002, Guild and four scuba divers took the first coral undersea readings nea Island, Bahamas, a University of Miami long-term research site. The divers, marine science exp from the universities of Miami, South Florida, and Puerto Rico.

New Instrumentation

In the future, researchers plan to fly "hyperspectral" instruments that contain several detectors to collect information in the visible light range. These instruments will provide the most useful information about coral reef community health from above the sea. Additional measurements taken underwater by scientists using sophisticated instruments will provide the necessary ground-truth data to calibrate airborne images.

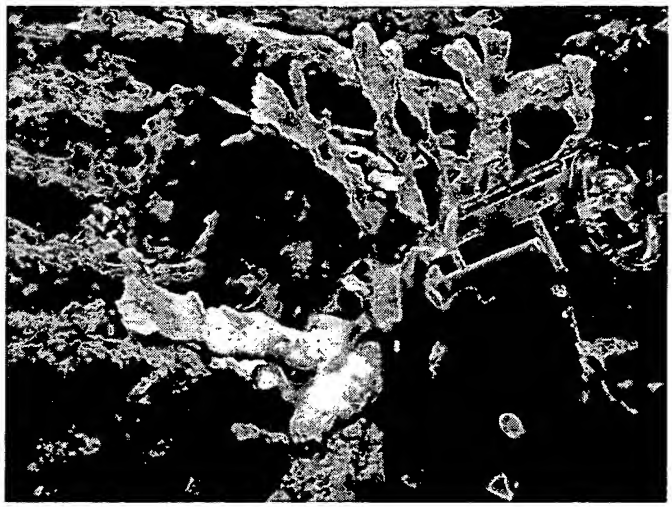
The team and engineering students from the University of Arizona also are developing a specialized computer model to analyze coral reflected-light data. The model will allow scientists to better interpret the raw data gathered by aircraft or satellites.

The team's research emphasis is on Acropora palmata, or elkhorn coral, a major reef-building coral. It is prevalent in the study area, but is suffering from "white band disease." Elkhorn coral is on the verge of becoming an endangered species because it has severely declined in many areas of the Caribbean.

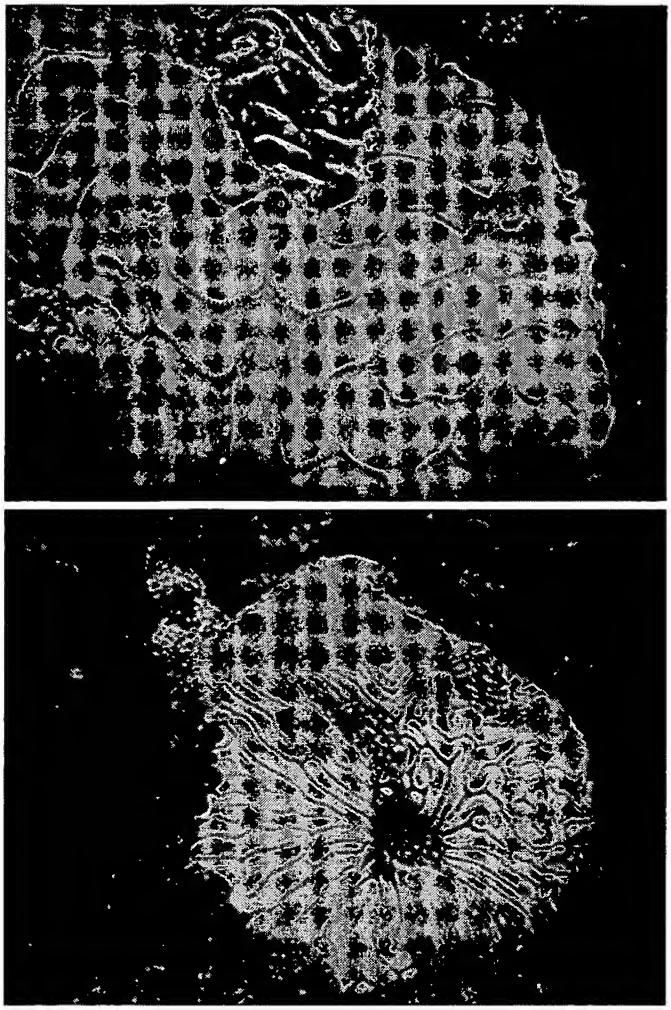


Above and below (click images for closer view): Checking Coral Health. Researchers using handheld "spectroradiometer" measure reflected light readings from Acropora palmata, or elkhorn coral to determine the reef health in the Bahamas. The collected data is compared to the reading taken during aerial surveys. CREDIT: NASA Ames Research Center.

development.
The developed instrumentation will be the first remote sensing device dedicated to the monitoring of the world?s coral reef ecosystems and coastal zone ecosystems. In early 2002, NASA?s SeaWiFS satellite was critical in providing an about a patch of "black water" spanning over 60 miles in diameter off southwestern Florida. Th caused by harmful algal blooms, contributed to severe coral reef stress and death in the Florid



Above (click on image for closer view): Elkhorn Coral. Acropora palmata, or elkhorn coral exhibiting white band disease. Acropora palmata is a major reef-building coral prevalent in the Bahamas, but is suffering from white band disease. Elkhorn coral has severely declined in many areas of the Caribbean and may be on the verge of becoming an endangered species.
CREDIT: NASA Ames Research Center



Above (click on image for closer view): Brain Coral with "white plague."
CREDIT: NASA Ames Research Center.

For more information on this research, please visit:

Clues to Coral Reef Health: Spectral Analysis and Radiative Transfer Modeling of Coral Reef Ecosystem Health

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